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YUNIBESITHI YA PRETORIA

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	H061028	PROJECT:	SOUTHERN DISTRICT		
ALTERNATIVE NO.:	W4932	SITE NAME:	PHYS 10		
ALTERNATIVE NO.: 25		CLIENT:	Research	PUMP INLET DIAMETER (mm):	100
BOREHOLE DEPTH (mbdl):	72.00	DATUM LEVEL (magl):	0.30	EXISTING PUMP:	no
STATIC WATER LEVEL (mbdl):	5.48	CASING HEIGHT (magl):	0.30	CONTRACTOR:	AB pumps
DEPTH OF PUMP (mbdl):	64.00	CASING DEPTH (magl):	12.00	PUMP TYPE USED:	BP40

DISCHARGE RATE 1

DATE: 24-Feb-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		1.86		1		
2		2.34		2		
3		2.69		3		
5		3.18		5		
7		3.28	0.70	7		
10		4.87	1.02	10		
15		6.56		15		
20		7.45		20		
30		7.79		30		
40		8.10		40		
50		8.83		50		
60		9.56		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 2

DATE: 24-Feb-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		10.20		1		
2		12.10		2		
3		14.05		3		
5		15.19		5		
7		16.18	2.04	7		
10		17.43		10		
15		19.02		15		
20		20.11		20		
30		20.71		30		
40		21.50		40		
50		21.90		50		
60		22.29		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 3

DATE: 24-Feb-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		25.30		1		
2		27.51		2		
3		31.51	4.00	3		
5		36.98		5		
7		40.65		7		
10		43.25		10		
15		45.20		15		
20		46.45		20		
30		48.67		30		
40		50.09		40		
50		51.71		50		
60		51.70		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 4

DATE: 24-Feb-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		
2				2		
3				3		
5				5		
7				7		
10				10		
15				15		
20				20		
30				30		
40				40		
50				50		
60				60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 5

DATE: 24-Feb-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		
2				2		
3				3		
5				5		
7				7		
10				10		
15				15		
20				20		
30				30		
40				40		
50				50		
60				60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 6

DATE: 24-Feb-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		30.230
2				2		22.280
3				3		16.030
5				5		8.630
7				7		4.980
10				10		3.090
15				15		2.360
20				20		2.200
30				30		1.950
40				40		1.750
50				60		1.550
60				90		1.290
70				120		1.100
80				150		1.040
90				180		0.960
100				210		0.880
110				240		0.800
120				300		0.770
				360		
				420		
				480		
				540		
				600		

COMMENTS:

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CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	H061028	PROJECT:	SOUTHERN DISTRICT		
ALTERNATIVE NO.:	W4932	SITE NAME:	PHYS 10		
ALTERNATIVE NO.:	25	CLIENT:	Research	PUMP INLET DIAMETER (mm):	100
BOREHOLE DEPTH (mbdl):	72.00	DATUM LEVEL (magl):	0.30	EXISTING PUMP:	no
STATIC WATER LEVEL (mbdl):	7.10	CASING HEIGHT (magl):	0.30	CONTRACTOR:	AB pumps
DEPTH OF PUMP (mbdl):	64.00	DEPTH (magl):	12.00	PUMP TYPE USED	BP40

TEST STARTED				TEST COMPLETED		DURATION (min):	
DATE:	17-Feb-99	TIME:	15h00	DATE:		TIME:	TOTAL TIME PUMPED (min):
AVERAGE YIELD (l/s):	1.4	S.W.L.:	7.1				

DISCHARGE BOREHOLE

Time	Drawdown		Yield	Time	Recovery		
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)	t/t'
1		8.40		1		29.07	4321
2		8.46		2		24.37	2161
3		8.52	1.40	3		23.84	1441
5		8.64		5		23.00	865
7		8.70		7		22.97	618.14
10		8.76		10		22.89	433
15		8.82		15		22.82	289
20		8.89		20		22.61	217
30		9.38		30		22.41	145
40		10.01		40		22.33	109
60		13.62		60		21.88	73
90		16.03		90		21.19	49
120		18.45		120		20.57	37
150		19.12		150		19.33	29.8
180		23.52		180		19.19	25
210		27.92		210		19.19	21.571
240		28.90		240		18.85	19
300		29.98		300		18.45	15.4
360		31.42		360		17.93	13
420		32.04		420		17.47	11.286
480		32.84		480		17.11	10
540		32.98		540		16.97	9
600		33.17		600		16.83	8.2
720		34.17		720		15.57	7
840		34.81		840		14.91	6.1429
960		35.15		960		14.64	5.5
1080		35.78		1080		14.10	5
1200		36.14		1200		13.49	4.6
1320		36.55		1320		13.12	4.2727
1440		36.80		1440		12.60	4
1560		36.86		1560		11.08	3.7692
1680		36.97		1680		10.80	3.5714
1800		37.01		1800		9.63	3.4
1920		37.15		1920		7.89	3.25
2040		37.15		2040		5.98	3.1176
2160		37.15		2160		4.31	3
2280		37.15		2280		3.21	2.8947
2400		37.16		2400		2.95	2.8
2520		37.16		2520		1.18	2.7143
2640		37.16		2640		0.75	2.6364
2760		37.16		2760		0.35	2.5652
2880		37.2		2880			
3000		37.2		3000			
3120		37.21		3120			
3240		37.21		3240			
3360		37.21		3360			
3480		37.21		3480			
3600		37.21	3.01	3600			
3720		37.22		3720			
3840		37.22		3840			
3960		37.22		3960			
4080		37.22		4080			
4200		37.22		4200			
4320		37.23		4320			
5040				5040			
5760				5760			
7200				7200			
10080				10080			

OBSERVATION BOREHOLES

	BOREHOLE 1		S.W.L.	BOREHOLE 2		S.W.L.	BOREHOLE 3		S.W.L
	No.: H06 1031		5.56	No.: H06 1027		6.68	No.: H06 1073		6.73
	Distance (m): 80			Distance (m): 100			Distance: 300		
Time	Drawdown		Rec	Time	Drawdown	Rec	Time	Drawdown	Rec
(min)	mbdl	(m)	(m)	(min)	mbdl (m)	(m)	(min)	mbdl (m)	(m)
1		0.00		1	0.00	0.06	1	0.00	0
2		0.00		2	0.01	0.06	2	0.00	
3		0.00		3	0.01	0.06	3	0.00	
5		0.00		5	0.02	0.06	5	0.00	
7		0.00		7	0.03	0.06	7	0.00	
10		0.00		10	0.03	0.06	10	0.00	
15		0.00		15	0.03	0.05	15	0.00	
20		0.00		20	0.03	0.05	20	0.00	
30		0.00		30	0.04	0.05	30	0.00	
40		0.00		40	0.04	0.05	40	0.00	
60		0.00		60	0.04	0.03	60	0.00	
90		0.00		90	0.04	0.03	90	0.00	
120		0.00		120	0.04	0.03	120	0.00	
150		0.00		150	0.04	0.03	150	0.00	
180		0.00		180	0.04	0.02	180	0.00	
210		0.00		210	0.04	0.02	210	0.00	
240		0.00		240	0.04	0.01	240	0.00	
300		0.00		300	0.05	0.01	300	0.00	
360		0.00		360	0.06	0	360	0.00	
420		0.00		420	0.06	0	420	0.00	
480		0.00		480	0.06		480	0.00	
540		0.00		540	0.06		540	0.00	
600		0.00		600	0.06		600	0.00	
720		0.00		720	0.06		720	0.00	
840		0.00		840	0.06		840	0.00	
960		0.00		960	0.06		960	0.00	
1080		0.00		1080	0.06		1080	0.00	
1200		0.00		1200	0.06		1200	0.00	
1320		0.00		1320	0.06		1320	0.00	
1440		0.00		1440	0.06		1440	0.00	
1560		0.00		1560	0.06		1560	0.00	
1680		0.00		1680	0.06		1680	0.00	
1800		0.00		1800	0.06		1800	0.00	
1920		0.00		1920	0.06		1920	0.00	
2040		0.00		2040	0.06		2040	0.00	
2160		0.00		2160	0.06		2160	0.00	
2280		0.00		2280	0.07		2280	0.00	
2400		0.00		2400	0.07		2400	0.00	
2520		0.00		2520	0.07		2520	0.00	
2640		0.00		2640	0.07		2640	0.00	
2760		0.00		2760	0.07		2760	0.00	
2880		0.00		2880	0.07		2880	0.00	
3000		0.00		3000	0.07		3000	0.00	
3120		0.00		3120	0.07		3120	0.00	
3240		0.00		3240	0.07		3240	0.00	
3360		0.00		3360	0.07		3360	0.00	
3480		0.00		3480	0.07		3480	0.00	
3600		0.00		3600	0.07		3600	0.00	
3720		0.00		3720	0.07		3720	0.00	
3840		0.00		3840	0.07		3840	0.00	
3960		0.00		3960	0.07		3960	0.00	
4080		0.00		4080	0.07		4080	0.00	
4200		0.00		4200	0.07		4200	0.00	
4320		0.00		4320	0.07		4320	0.00	
5040				5040			5040		
5760				5760			5760		
7200				7200			7200		
10080				10080			10080		

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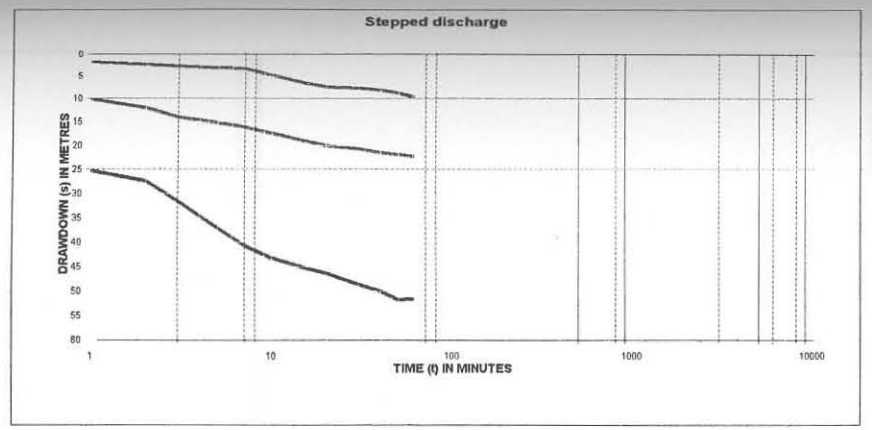

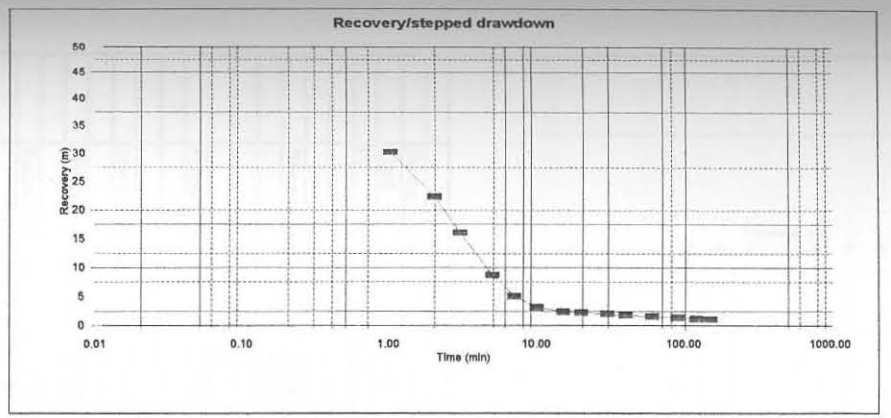

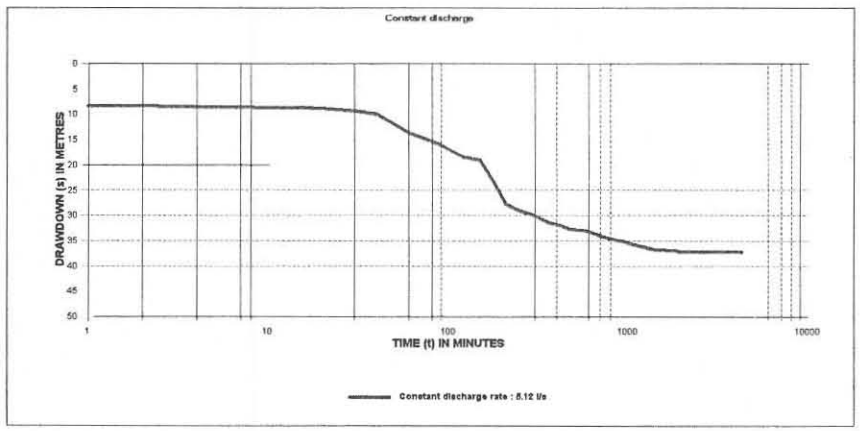

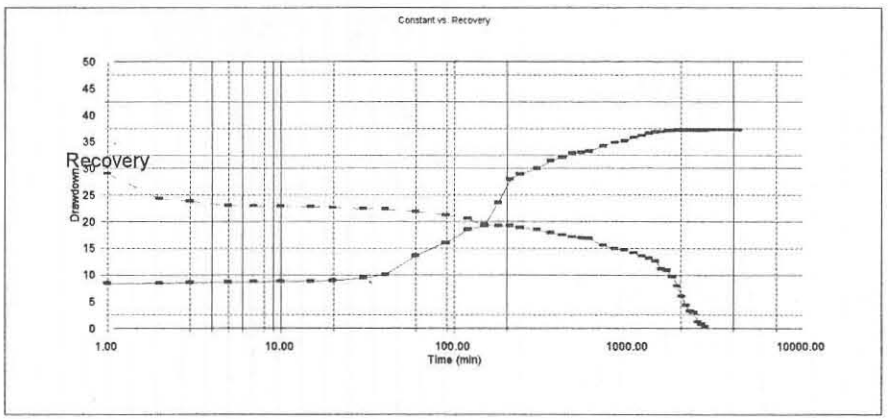

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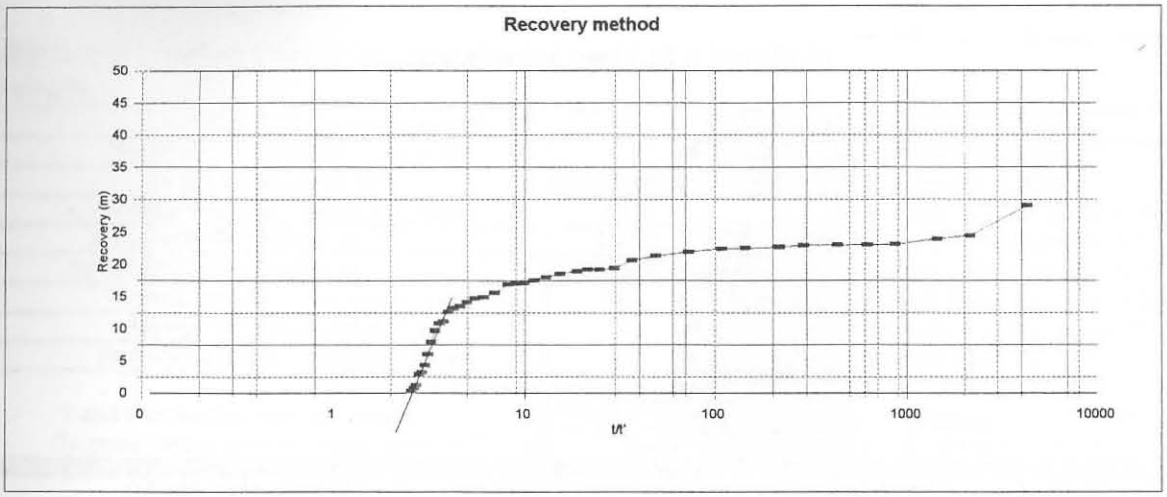

	Pump cycle =	1440	min (24hrs)	
	Yield =	1.4	l/s	
	t/t" =	2.7	(Graph)	
	Recovery period =	1440 /	t/t"	
		1440 /	2.70	
			533.33 min	
	Pumping period =	1440 -	533.33	
			906.67 min	
	Litres pumped =	7.62E+04	L	
	Pump yield @ 24 hrs	0.88	L/s	
	Factor of safety =	0.75		
	Operating yield =	**0.66**	**L/s for 24 hrs**	

Comments:

Comments:

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FC-METHOD : Estimation of the sustainable yield of a borehole

Borehole:

Extrapolation time in years = (enter)	3	1576800	Extrapol.time in minutes
Effective borehole radius (r_e) = (enter)	0.5	0.5	Estimate of effective r_e
Q (l/s) from pumping test =	1.48	0.02	Estimate of t_c of WBS
s_a (available drawdown), sigma_s = (enter)	57.52	10	Sigma_s from risk analysis
Annual effective recharge (m) =	0.0067	54.22	s_available working drawdown(m)
t(end) and s(end) of pumping test =	4320	37.23	End time and drawdown of test
Average maximum derivative = (enter)	38.6	38.6	Estimate of average of max deriv
Average second derivative = (enter)	0	-0.3	Estimate of average second deriv
Derivative at radial flow period = (enter)	10		Read from derivative graph
	T-early[m^2/d] =	2.34	
T and S estimates from derivatives	T-late [m^2/d] =	0.61	T-average = 1.19
(To obtain correct S-value, use program RPTSOLV)	S-late =	2.53E-03	S-estimate could be wrong

BASIC SOLUTION

(Using derivatives + subjective information about boundaries)

(No values of T and S are necessary)

		Maximum influence of boundaries at long time		
	No boundaries	1 no-flow	2 no-flow	Closed no-flow
sWell (Extrapol.time) =	136.13	235.04	333.94	630.66
Q_sust (l/s) =	0.59	0.34	0.24	0.13
	Best case	→		Worst case

Average Q_sust (l/s) = 0.28

with standard deviation= 0.20

(If no information exists about boundaries skip advanced solution and go to final recommendation)

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RULE of THUMB

Bh no.		H06 1028	
TT	=	PT + recovery time	
	=	4320	2760
	=	7080	
	=	424800	seconds
TV	=	L/s*TP	
	=	1.4	4320
	=	362880	litres
Yield	=	TV/TT	
		0.85423729	l/s
Production yield			
	=	Yield *FS	
	=	0.85423729	70%
	=	0.64067797	l/s @ 24hrs

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STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	H06 1496	PROJECT:	SOUTHERN DISTRICT
ALTERNATIVE NO.:		SITE NAME:	PHYS 11
ALTERNATIVE NO.:		CLIENT:	Research

BOREHOLE DEPTH (mbdl):	150.00	DATUM LEVEL (magl):	0.00	PUMP INLET DIAMETER (mm):	100
STATIC WATER LEVEL (mbdl):	2.43	CASING HEIGHT (magl):	0.00	EXISTING PUMP:	no
DEPTH OF PUMP (mbdl):	96.00	CASING DEPTH (magl):	15.00	CONTRACTOR:	AB pumps
				PUMP TYPE USED:	BP40

DISCHARGE RATE 1

DATE:	01-Mar-99		TIME:			
Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		0.51		1		
2		0.92		2		
3		1.74		3		
5		2.94		5		
7		4.90	1.04	7		
10		6.38		10		
15		10.08		15		
20		11.17		20		
30		12.86		30		
40		13.70		40		
50		14.14		50		
60		14.60		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 2

DATE:	01-Mar-99		TIME:			
Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		16.58		1		
2		18.46		2		
3		20.42		3		
5		32.50	2.06	5		
7		37.76		7		
10		44.80		10		
15		50.30		15		
20		53.23		20		
30		55.72		30		
40		56.73		40		
50		57.40		50		
60		58.17		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 3

DATE:	01-Mar-99		TIME:			
Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		66.14		1		
2		73.68		2		
3		82.14		3		
5		84.87		5		
7		87.03		7		
10		88.33		10		
15		92.00		15		
20				20		
30				30		
40				40		
50				50		
60				60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 4

DATE:	01-Mar-99		TIME:			
Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		
2				2		
3				3		
5				5		
7				7		
10				10		
15				15		
20				20		
30				30		
40				40		
50				50		
60				60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 5

DATE:	01-Mar-99		TIME:			
Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		
2				2		
3				3		
5				5		
7				7		
10				10		
15				15		
20				20		
30				30		
40				40		
50				50		
60				60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 6

DATE:	01-Mar-99		TIME:			
Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		77.220
2				2		73.300
3				3		73.020
5				5		68.640
7				7		64.500
10				10		56.140
15				15		45.880
20				20		38.760
30				30		22.460
40				40		10.050
50				60		0.890
60				90		0.840
70				120		0.750
80				150		0.740
90				180		0.710
100				210		0.630
110				240		0.450
120				300		0.380
				360		0.150
				420		0.05
				480		0.00
				540		
				600		

COMMENTS:

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YUNIBESITHI YA PRETORIA

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	H06 1496	PROJECT:	SOUTHERN DISTRICT
ALTERNATIVE NO.:		SITE NAME:	PHYS 11
ALTERNATIVE NO.:		CLIENT:	Research

BOREHOLE DEPTH (mbdl):	150.00	DATUM LEVEL (magl):	0.00	EXISTING PUMP:	no
STATIC WATER LEVEL (mbdl):	2.43	CASING HEIGHT (magl):	0.00	CONTRACTOR:	AB pumps
DEPTH OF PUMP (mbdl):	96.00	CASING DEPTH (magl):	15.00	PUMP TYPE USED	BP40

PUMP INLET DIAMETER (mm): 100

TEST STARTED				TEST COMPLETED		DURATION (min):	
DATE:	17-Feb-99	TIME:	11h00	DATE:		TIME:	TOTAL TIME PUMPED (min):
AVERAGE YIELD (l/s):	1.03	S.W.L.:	2.43				

DISCHARGE BOREHOLE

Time	Drawdown		Yield	Time	Recovery		
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)	t/t'
1		4.65		1		58.91	2161
2		8.89		2		56.40	1081
3		10.25		3		54.14	721
5		11.18	1.03	5		52.98	433
7		12.77		7		50.75	309.57
10		15.97		10		49.08	217
15		21.74		15		47.91	145
20		25.08		20		45.84	109
30		28.42		30		44.15	73
40		32.14		40		42.95	55
60		34.14		60		40.82	37
90		36.07		90		38.12	25
120		38.03		120		36.74	19
150		41.96		150		34.65	15.4
180		43.87		180		32.85	13
210		45.79	1.03	210		30.12	11.286
240		47.73		240		28.12	10
300		49.84		300		26.30	8.2
360		51.03		360		24.19	7
420		52.96		420		22.60	6.1429
480		53.94		480		20.18	5.5
540		54.88		540		18.74	5
600		55.79		600		16.25	4.6
720		56.72		720		13.98	4
840		57.59	1.04	840		9.96	3.5714
960		58.48		960		6.78	3.25
1080		59.51		1080		3.65	3
1200		60.48		1200		1.04	2.8
1320		61.46	1.03	1320		0.87	2.6364
1440		62.45		1440		0.55	2.5
1560		63.35		1560		0.41	2.3846
1680		64.12		1680		0.29	2.2857
1800		64.20		1800		0.12	2.2
1920		64.85		1920		0.07	2.125
2040		65.4		2040		0.04	2.0588
2160		65.97		2160		0	2
2280				2280			
2400				2400			
2520				2520			
2640				2640			
2760				2760			
2880				2880			
3000				3000			
3120				3120			
3240				3240			
3360				3360			
3480				3480			
3600				3600			
3720				3720			
3840				3840			
3960				3960			
4080				4080			
4200				4200			
4320				4320			
5040				5040			
5760				5760			
7200				7200			
10080				10080			

OBSERVATION BOREHOLES

BOREHOLE 1			S.W.L.	BOREHOLE 2			S.W.L.	BOREHOLE 3			S.W.L
No.:	H06 1065			No.:	H06 1497			No.:	H10 64		
Distance (m):	30		3.34	Distance (m):	100		25.75	Distance:	150		28.65
Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec
(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)
1		0.00	0.18	1		0.01	0.04	1		0.01	0.01
2		0.00	0.18	2		0.01	0.04	2		0.01	0.01
3		0.00	0.18	3		0.01	0.04	3		0.01	0.01
5		0.00	0.17	5		0.01	0.03	5		0.01	0.01
7		0.00	0.17	7		0.01	0.03	7		0.01	0.01
10		0.00	0.17	10		0.01	0.03	10		0.01	0.01
15		0.00	0.17	15		0.01	0.03	15		0.01	0.01
20		0.00	0.16	20		0.01	0.02	20		0.02	0.01
30		0.00	0.16	30		0.01	0.02	30		0.02	0.01
40		0.00	0.15	40		0.01	0.02	40		0.02	0.00
60		0.00	0.15	60		0.01	0.01	60		0.02	0.00
90		0.00	0.14	90		0.01	0.01	90		0.02	
120		0.01	0.14	120		0.01	0.01	120		0.02	
150		0.02	0.13	150		0.01	0.01	150		0.02	
180		0.02	0.13	180		0.01	0	180		0.02	
210		0.02	0.12	210		0.01	0	210		0.02	
240		0.06	0.11	240		0.01		240		0.02	
300		0.07	0.1	300		0.01		300		0.02	
360		0.07	0.1	360		0.01		360		0.02	
420		0.07	0.09	420		0.01		420		0.02	
480		0.07	0.09	480		0.02		480		0.02	
540		0.07	0.09	540		0.03		540		0.02	
600		0.07	0.08	600		0.03		600		0.02	
720		0.07	0.08	720		0.03		720		0.02	
840		0.07	0.08	840		0.04		840		0.02	
960		0.07	0.07	960		0.04		960		0.02	
1080		0.07	0.07	1080		0.04		1080		0.02	
1200		0.08	0.06	1200		0.04		1200		0.02	
1320		0.08	0.06	1320		0.04		1320		0.02	
1440		0.08	0.06	1440		0.04		1440		0.02	
1560		0.11	0.05	1560		0.04		1560		0.02	
1680		0.13	0.04	1680		0.04		1680		0.02	
1800		0.16	0.04	1800		0.04		1800		0.02	
1920		0.16	0.03	1920		0.04		1920		0.02	
2040		0.18	0.02	2040		0.04		2040		0.02	
2160		0.18	0	2160		0.04		2160		0.02	
2280				2280				2280			
2400				2400				2400			
2520				2520				2520			
2640				2640				2640			
2760				2760				2760			
2880				2880				2880			
3000				3000				3000			
3120				3120				3120			
3240				3240				3240			
3360				3360				3360			
3480				3480				3480			
3600				3600				3600			
3720				3720				3720			
3840				3840				3840			
3960				3960				3960			
4080				4080				4080			
4200				4200				4200			
4320				4320				4320			
5040				5040				5040			
5760				5760				5760			
7200				7200				7200			
10080				10080				10080			

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ERVATION BOREHOLES FOR CD (4,5,6,7& 8)

BOREHOLE NO.:	H06 1496	PROJECT:	SOUTHERN DISTRICT
ALTERNATIVE NO.:		SITE NAME:	PHYS 11
ALTERNATIVE NO.:		CLIENT: Research	PUMP INLET DIAMETER (mm): 100
BOREHOLE DEPTH (mbdl):	150.00	DATUM LEVEL (magl):	0.00
STATIC WATER LEVEL (mbdl):	2.43	CASING HEIGHT (magl):	0.00
DEPTH OF PUMP (mbdl):	96.00	CASING DEPTH (magl):	15.00
		EXISTING PUMP:	no
		CONTRACTOR:	AB pumps
		PUMP TYPE USED:	BP40

TEST STARTED		TEST COMPLETED		DURATION (min):	
DATE:	TIME:	DATE:	TIME:	TOTAL TIME PUMPED (min):	

OBSERVATION BOREHOLES

BOREHOLE 4			S.W.L.	BOREHOLE 5			S.W.L.	BOREHOLE 6			S.W.L.	BOREHOLE 7			S.W.L.	BOREHOLE 8			S.W.L.
No.: H06 1495				No.: H06 1066				No.: H14 0913				No.:				No.:			
Distance (m): 101			24.33	Distance (m): 300			10.75	Distance (m): 300			24.9	Distance (m):				Distance:			
Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec
(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)
1		0.00	0.03	1		0.00	0.03	1				1				1			
2		0.00	0.03	2		0.00	0.03	2				2				2			
3		0.00	0.03	3		0.00	0.03	3				3				3			
5		0.00	0.03	5		0.00	0.02	5				5				5			
7		0.00	0.03	7		0.00	0.02	7				7				7			
10		0.00	0.03	10		0.00	0.02	10				10				10			
15		0.00	0.02	15		0.00	0.02	15				15				15			
20		0.00	0.02	20		0.00	0.02	20				20				20			
30		0.00	0.02	30		0.00	0.02	30				30				30			
40		0.00	0.01	40		0.00	0.02	40				40				40			
60		0.00	0.01	60		0.00	0.01	60				60				60			
90		0.00	0.01	90		0.00	0.01	90				90				90			
120		0.00	0.01	120		0.00	0.01	120				120				120			
150		0.00	0.01	150		0.00	0	150				150				150			
180		0.00	0.01	180		0.00	0	180				180				180			
210		0.00	0	210		0.02		210				210				210			
240		0.02	0	240		0.02		240				240				240			
300		0.02		300		0.02		300				300				300			
360		0.02		360		0.02		360				360				360			
420		0.02		420		0.02		420				420				420			
480		0.02		480		0.02		480				480				480			
540		0.02		540		0.02		540				540				540			
600		0.03		600		0.02		600				600				600			
720		0.03		720		0.02		720				720				720			
840		0.03		840		0.02		840				840				840			
960		0.03		960		0.02		960				960				960			
1080		0.03		1080		0.03		1080				1080				1080			
1200		0.03		1200		0.03		1200				1200				1200			
1320		0.03		1320		0.03		1320				1320				1320			
1440		0.03		1440		0.03		1440				1440				1440			
1560		0.03		1560		0.03		1560				1560				1560			
1680		0.03		1680		0.03		1680				1680				1680			
1800		0.03		1800		0.03		1800				1800				1800			
1920		0.03		1920		0.03		1920				1920				1920			
2040		0.03		2040		0.03		2040				2040				2040			
2160		0.03		2160		0.04		2160				2160				2160			
2280				2280				2280				2280				2280			
2400				2400				2400				2400				2400			
2520				2520				2520				2520				2520			
2640				2640				2640				2640				2640			
2760				2760				2760				2760				2760			
2880				2880				2880				2880				2880			
3000				3000				3000				3000				3000			
3120				3120				3120				3120				3120			
3240				3240				3240				3240				3240			
3360				3360				3360				3360				3360			
3480				3480				3480				3480				3480			
3600				3600				3600				3600				3600			
3720				3720				3720				3720				3720			
3840				3840				3840				3840				3840			
3960				3960				3960				3960				3960			
4080				4080				4080				4080				4080			
4200				4200				4200				4200				4200			
4320				4320				4320				4320				4320			
5040				5040				5040				5040				5040			
5720				5720				5720				5720				5720			
7200				7200				7200				7200				7200			
10080				10080				10080				10080				10080			

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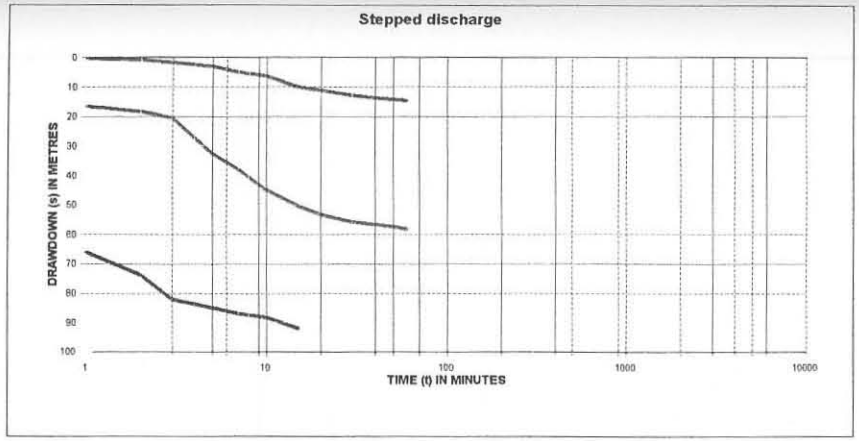
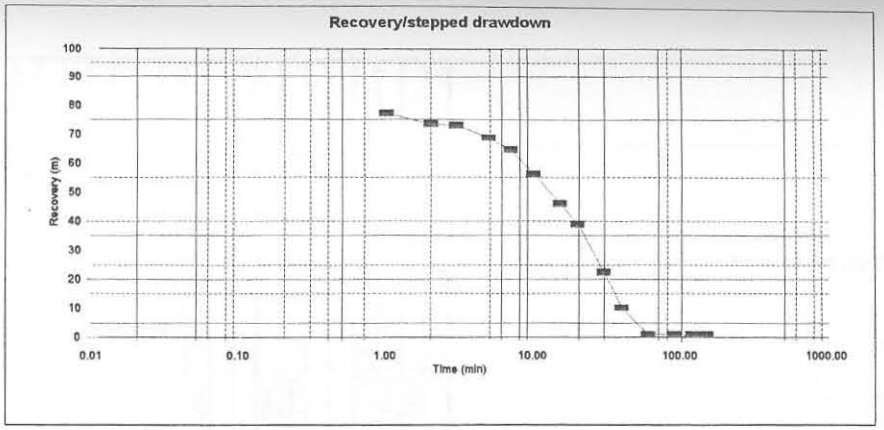
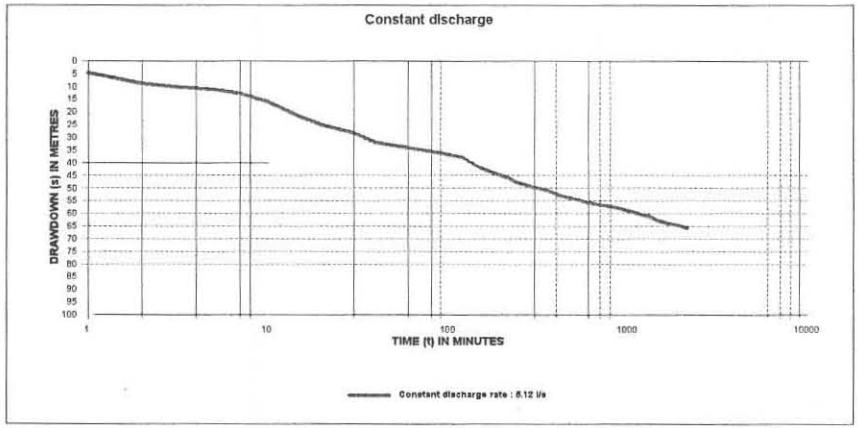
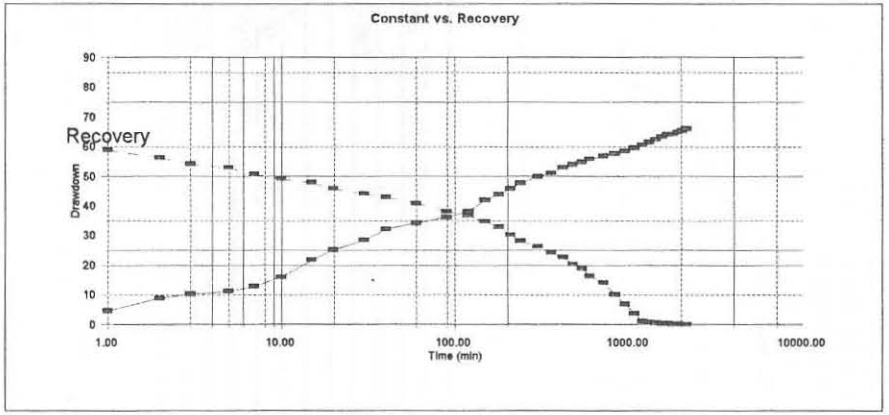
BOR... E NUI 1496









Comments:

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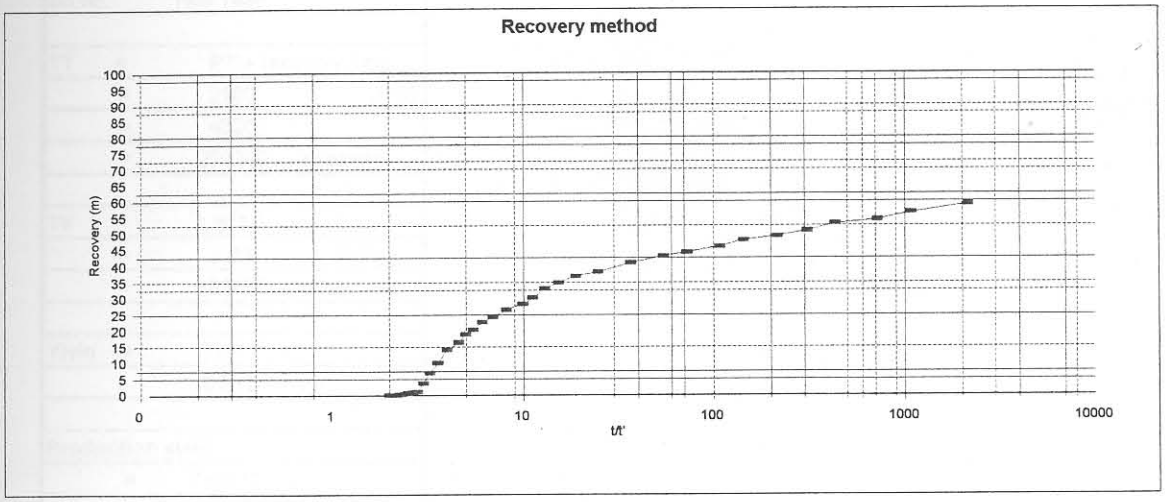
E NUMBER: H06 1496



	Pump cycle	=	1440	min	(24hrs)
	Yield	=	1.03	l/s	
	t/t"	=	2	(Graph)	
	Recovery period	=	1440 /	t/t"	
			1440 /	2.00	
				720.00	min
	Pumping period	=	1440 -	720.00	
				720.00	min
	Litres pumped	=	4.45E+04	L	
	Pump yield @ 24 hrs		0.52	L/s	
	Factor of safety	=	0.75		
	Operating yield	=	**0.39**	**L/s for 24 hrs**	

Comments:

Comments:

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RULE of THUMB

Bh no.		H06 1496	
TT	=	PT + recovery time	
	=	2160	2160
	=	4320	
	=	259200	seconds
TV	=	L/s*TP	
	=	1.03	2160
	=	133488	litres
Yield	=	TV/TT	
		0.515	l/s
Production yield			
	=	Yield *FS	
	=	0.515	75%
	=	0.38625	l/s @ 24hrs

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FC-METHOD : Estimation of the sustainable yield of a borehole

Borehole:

Extrapolation time in years = (enter)	3	1576800	Extrapol.time in minutes
Effective borehole radius (r_e) = (enter)	4.5 ←	0.4	Estimate of effective r_e
Q (l/s) from pumping test =	1.03	0.03	Estimate of t_c of WBS
s_a (available drawdown), sigma_s = (enter)	90	10 ←	Sigma_s from risk analysis
Annual effective recharge (m) =	0.007	87.00	s_available working drawdown(m)
t(end) and s(end) of pumping test =	2160	65.97	End time and drawdown of test
Average maximum derivative = (enter)	29 ←	29.0	Estimate of average of max deriv
Average second derivative = (enter)	0 ←	0.0	Estimate of average second deriv
Derivative at radial flow period = (enter)	15.88 ←		Read from derivative graph
	T-early[m^2/d] =	1.03	
T and S estimates from derivatives	T-late [m^2/d] =	0.56	T-average = 0.76
(To obtain correct S-value, use program RPTSOLV)	S-late =	1.10E-05	S-estimate could be wrong

BASIC SOLUTION

(Using derivatives + subjective information about boundaries)

(No values of T and S are necessary)

		Maximum influence of boundaries at long time		
	No boundaries	1 no-flow	2 no-flow	Closed no-flow
sWell (Extrapol.time) =	149.01	232.04	315.08	564.19
Q_sust (l/s) =	0.60	0.39	0.28	0.16
	Best case	→		Worst case

Average Q_sust (l/s) = 0.32

with standard deviation= 0.19

(If no information exists about boundaries skip advanced solution and go to final recommendation)

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STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	H06 1038	PROJECT:	SOUTHERN DISTRICT
ALTERNATIVE NO.:		SITE NAME:	PHYS 14
ALTERNATIVE NO.:		CLIENT:	Research

BOREHOLE DEPTH (mbdl):	102.00	DATUM LEVEL (magl):	0.23	PUMP INLET DIAMETER (mm):	100
STATIC WATER LEVEL (mbdl):	10.39	CASING HEIGHT (magl):	0.30	EXISTING PUMP:	no
DEPTH OF PUMP (mbdl):	93.00	CASING DEPTH (magl):	18.00	CONTRACTOR:	AB pumps
				PUMP TYPE USED:	BP40

DISCHARGE RATE 1

DATE: 25-Mar-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		1.87		1		
2		2.18		2		
3		2.42		3		
5		2.69	3.70	5		
7		2.93		7		
10		3.14		10		
15		3.51	3.70	15		
20		3.76		20		
30		3.99		30		
40		4.35		40		
50		4.56	3.71	50		
60		4.72		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 2

DATE: 25-Mar-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		5.79		1		
2		6.65		2		
3		6.80		3		
5		6.97	7.02	5		
7		7.21		7		
10		7.62		10		
15		8.27	7.02	15		
20		8.58		20		
30		8.98		30		
40		9.37		40		
50		9.79	7.01	50		
60		9.95		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 3

DATE: 25-Mar-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		10.27		1		
2		10.51		2		
3		10.91		3		
5		11.30	14.08	5		
7		12.21		7		
10		13.71		10		
15		14.01		15		
20		18.66		20		
30		21.42		30		
40		22.64		40		
50		23.68		50		
60		24.31		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 4

DATE: 25-Mar-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1		36.18		1		
2		39.70		2		
3		43.72		3		
5		47.79		5		
7		50.26	28.00	7		
10		52.78		10		
15		55.68		15		
20		57.87		20		
30		60.65		30		
40		63.01		40		
50		64.81		50		
60		66.45		60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 5

DATE: 25-Mar-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		
2				2		
3				3		
5				5		
7				7		
10				10		
15				15		
20				20		
30				30		
40				40		
50				50		
60				60		
70				70		
80				80		
90				90		
100				100		
110				110		
120				120		
				150		

DISCHARGE RATE 6

DATE: 25-Mar-99 TIME:

Time	Drawdown		Yield	Time	Recovery	
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)
1				1		28.200
2				2		24.880
3				3		23.210
5				5		21.600
7				7		19.800
10				10		18.550
15				15		17.450
20				20		15.770
30				30		13.760
40				40		12.860
50				60		11.740
60				90		10.710
70				120		9.680
80				150		9.300
90				180		8.730
100				210		8.520
110				240		8.250
120				300		7.980
				360		7.700
				420		7.05
				480		6.92
				540		6.1
				600		5.36

COMMENTS:

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CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	H06 1038	PROJECT:	SOUTHERN DISTRICT
ALTERNATIVE NO.:		SITE NAME:	PHYS 13
ALTERNATIVE NO.:		CLIENT:	Research
PUMP INLET DIAMETER (mm):	100		
BOREHOLE DEPTH (mbdl):	102.00	DATUM LEVEL (magl):	0.23
EXISTING PUMP:	no		
STATIC WATER LEVEL (mbdl):	2.43	CASING HEIGHT (magl):	0.30
CONTRACTOR:	AB pumps		
DEPTH OF PUMP (mbdl):	93.00	CASING DEPTH (magl):	18.00
PUMP TYPE USED:	BP40		

TEST STARTED			TEST COMPLETED		DURATION (min):
DATE:	31-Mar-99	TIME:	DATE:	TIME:	TOTAL TIME PUMPED (min):
AVERAGE YIELD (l/s):	16.06	S.W.L.: 15.33			

DISCHARGE BORE

OBSERVATION BOREHOLES

Time	Drawdown		Yield	Time	Recovery		
(min)	mbdl	(m)	(l/s)	(min)	mbdl	(m)	t/t'
1		14.60		1		67.20	4321
2		15.82		2		62.57	2161
3		15.98		3		60.39	1441
5		20.23		5		58.95	865
7		22.01		7		57.85	618.14
10		24.70		10		56.92	433
15		26.36		15		53.95	289
20		27.83		20		53.27	217
30		29.22		30		52.54	145
40		30.55		40		51.72	109
60		32.28		60		50.38	73
90		34.46		90		47.70	49
120		36.38		120		46.25	37
150		37.94		150		45.22	29.8
180		39.13		180		44.26	25
210		40.49		210		43.26	21.571
240		41.15		240		42.98	19
300		42.78		300		42.34	15.4
360		43.92		360		41.70	13
420		45.06		420		41.06	11.286
480		46.47		480		40.04	10
540		47.38		540		39.78	9
600		48.54		600		39.14	8.2
720		50.35		720		38.50	7
840		52.16		840		37.80	6.1429
960		53.97		960		37.22	5.5
1080		55.78		1080		36.58	5
1200		57.59		1200		35.94	4.6
1320		62.20		1320		35.30	4.2727
1440		63.61		1440		34.62	4
1560		66.34		1560		33.95	3.7692
1680		68.19		1680		33.37	3.5714
1800		69..96		1800		32.66	3.4
1920		70.65		1920		32.04	3.25
2040		71.13		2040		31.64	3.1176
2160		71.51		2160		31.24	3
2280		71.9		2280		30.84	2.8947
2400		72.29		2400		30.44	2.8
2520		72.68		2520		30.04	2.7143
2640		73.07		2640		29.64	2.6364
2760		74.16		2760		29.24	2.5652
2880		74.76		2880		28.84	2.5
3000		75.14		3000		28.36	2.44
3120		75.86		3120		28.05	2.3846
3240		76.19		3240		27.64	2.3333
3360		76.91		3360		27.23	2.2857
3480		77.19		3480		26.93	2.2414
3600		77.85		3600		26.63	2.2
3720		78.26		3720		26.33	2.1613
3840		78.94		3840		26.03	2.125
3960		79.36		3960		25.73	2.0909
4080		80.01		4080		25.43	2.0588
4200		80.56		4200		25.08	2.0286
4320		81.43		4320		24.93	2
5040				5040		23.269	1.8571
5760				5760		22.3	1.75
7200				7200		19.9	1.6
10080				10080		15.47	1.4286

BOREHOLE 1			S.W.L.	BOREHOLE 2			S.W.L.	BOREHOLE 3			S.W.L
No.: H06 1039			16.14	No.: H06 0912			14.9	No.: H06 1053			
Distance (m):				Distance (m):				Distance: 60.6			9.83
Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec
(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)
1		0.00	45.08	1		0.20	44.9	1		0.01	38.8
2		0.10	44.9	2		0.80	44.81	2		0.05	38.76
3		0.50	44.7	3		1.53	44.72	3		0.20	38.7
5		0.97	44.65	5		2.20	44.63	5		0.40	38.68
7		1.60	44.6	7		3.70	44.54	7		0.62	38.61
10		1.89	44.55	10		4.50	44.45	10		0.92	38.55
15		2.13	44.5	15		5.17	44.36	15		1.20	38.5
20		7.62	44.45	20		6.74	44.27	20		1.70	38.47
30		9.14	44.4	30		7.83	44.09	30		3.37	38.4
40		9.85	44.35	40		8.71	44	40		4.23	38.36
60		12.71	44.3	60		10.56	43.95	60		5.77	38.56
90		14.22	43.22	90		12.76	43.81	90		7.78	37.66
120		16.20	42.3	120		14.57	42.9	120		9.52	37.16
150		17.84	42.03	150		16.26	42.27	150		11.56	36.73
180		18.93	41.64	180		17.35	41.46	180		12.30	36.27
210		19.96	40.88	210		19.00	40.79	210		14.14	35.87
240		20.50	40.12	240		19.39	40.12	240		14.68	35.47
300		22.06	39.36	300		20.33	39.45	300		16.78	35.07
360		22.80	38.6	360		22.45	38.78	360		18.14	34.67
420		24.63	37.84	420		23.57	38.11	420		19.50	34.27
480		25.06	37.08	480		24.70	37.44	480		20.96	33.87
540		25.74	36.32	540		25.63	36.77	540		21.85	33.47
600		26.23	35.56	600		26.32	36.1	600		22.67	33.07
720		27.20	34.8	720		27.42	35.43	720		23.91	32.59
840		28.17	34.04	840		28.52	34.76	840		24.61	32.37
960		29.14	33.28	960		29.62	34.09	960		25.31	31.87
1080		30.11	32.52	1080		30.72	33.49	1080		26.01	31.47
1200		31.08	31.76	1200		31.82	32.75	1200		26.71	31.07
1320		32.06	31.01	1320		32.97	32.08	1320		27.43	30.67
1440		31.02	30.22	1440		34.10	31.34	1440		29.50	29.15
1560		34.26	29.4	1560		35.47	30.49	1560		30.20	28.98
1680		35.53	28.67	1680		36.65	29.72	1680		31.98	28.8
1800		37.16	27.95	1800		38.01	28.76	1800		32.09	27.67
1920		38.84	27.24	1920		39.35	27.26	1920		33.24	26.49
2040		39.62	26.83	2040		40.16	26.86	2040		33.69	26.1
2160		39.82	26.46	2160		40.53	26.46	2160		34.18	25.71
2280		40.02	26.01	2280		40.92	26.06	2280		34.67	25.32
2400		40.26	25.6	2400		41.31	25.66	2400		35.16	24.95
2520		40.42	25.19	2520		41.70	26.26	2520		35.65	24.54
2640		40.62	24.78	2640		42.09	24.86	2640		36.14	24.15
2760		40.83	24.37	2760		42.48	24.46	2760		36.63	23.76
2880		41.04	23.94	2880		42.77	24.04	2880		37.12	23.33
3000		41.52	26.63	3000		43.36	23.61	3000		37.98	22.82
3120		43.23	26.21	3120		44.97	23.19	3120		39.01	22.5
3240		45.94	22.7	3240		45.26	22.78	3240		38.03	22.14
3360		46.83	22.29	3360		45.58	22.39	3360		38.06	21.8
3480		47.72	21.97	3480		45.83	22.07	3480		38.08	21.49
3600		48.61	21.65	3600		45.96	21.75	3600		38.09	21.18
3720		49.59	21.33	3720		46.14	21.43	3720		38.10	20.87
3840		49.94	21.1	3840		46.26	21.11	3840		38.11	20.56
3960		50.23	20.69	3960		46.39	20.79	3960		38.12	20.25
4080		50.44	20.37	4080		46.5	20.47	4080		38.13	19.94
4200		50.62	20.02	4200		46.59	20.12	4200		38.15	19.6
4320		50.81	19.81	4320		46.68	19.94	4320		38.17	19.45
5040			18.13	5040			18.41	5040			17.96
5760			16.33	5760			16.75	5760			16.4
7200			13.88	7200			14.27	7200			13.98
10080			10.14	10080			10.48	10080			10.33

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ATION BOREHOLES FOR CD (4,5,6,7& 8)

BOREHOLE NO.:	H06 1038	PROJECT:	SOUTHERN DISTRICT
ALTERNATIVE NO.:		SITE NAME:	PHYS 13
ALTERNATIVE NO.:		CLIENT:	Research

BOREHOLE DEPTH (mbdl):	102.00	DATUM LEVEL (magl):	0.23	EXISTING PUMP:	no
STATIC WATER LEVEL (mbdl):	2.43	CASING HEIGHT (magl):	0.30	CONTRACTOR:	AB pumps
DEPTH OF PUMP (mbdl):	93.00	CASING DEPTH (magl):	18.00	PUMP TYPE USED:	BP40

PUMP INLET DIAMETER (mm): 100

TEST STARTED		TEST COMPLETED		DURATION (min):
DATE:	TIME:	DATE:	TIME:	TOTAL TIME PUMPED (min):

OBSERVATION BOREHOLES

	BOREHOLE 4			S.W.L.	BOREHOLE 5			S.W.L.	BOREHOLE 6			S.W.L.	BOREHOLE 7			S.W.L.	BOREHOLE 8			S.W.L.
	No.: H06 1496				No.: H06 1408			8.68	No.: H06 0920			10.15	No.: H06 1050				No.:			
	Distance (m): 101			24.33	Distance (m):				Distance (m): 360.2				Distance (m):			20.86	Distance:			
	Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec	Time	Drawdown		Rec
	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)	(min)	mbdl	(m)	(m)
	1		0.00	0.03	1		0.00	2.32	1		0.00	0	1		0.00	1.45	1			
	2		0.00	0.03	2		0.00	2.3	2		0.00		2		0.00	1.45	2			
	3		0.00	0.03	3		0.00	2.28	3		0.00		3		0.00	1.45	3			
	5		0.00	0.03	5		0.00	2.26	5		0.00		5		0.00	1.45	5			
	7		0.00	0.03	7		0.00	2.23	7		0.00		7		0.00	1.45	7			
	10		0.00	0.03	10		0.00	2.2	10		0.00		10		0.00	1.44	10			
	15		0.00	0.02	15		0.00	2.17	15		0.00		15		0.00	1.44	15			
	20		0.00	0.02	20		0.00	2.14	20		0.00		20		0.00	1.43	20			
	30		0.00	0.02	30		0.00	2.11	30		0.00		30		0.00	1.43	30			
	40		0.00	0.01	40		0.00	2.08	40		0.00		40		0.00	1.43	40			
	60		0.00	0.01	60		0.00	2.06	60		0.00		60		0.00	1.43	60			
	90		0.00	0.01	90		0.00	2.04	90		0.00		90		0.00	1.42	90			
	120		0.00	0.01	120		0.00	2.02	120		0.00		120		0.00	1.42	120			
	150		0.00	0.01	150		0.00	1.99	150		0.00		150		0.00	1.42	150			
	180		0.00	0.01	180		0.00	1.96	180		0.00		180		0.00	1.4	180			
	210		0.00	0	210		0.00	1.95	210		0.00		210		0.00	1.38	210			
	240		0.02	0	240		0.00	1.9	240		0.00		240		0.00	1.36	240			
	300		0.02		300		0.00	1.88	300		0.00		300		0.00	1.33	300			
	360		0.02		360		0.00	1.86	360		0.00		360		0.00	1.3	360			
	420		0.02		420		0.00	1.84	420		0.00		420		0.00	1.27	420			
	480		0.02		480		0.00	1.81	480		0.00		480		0.03	1.2	480			
	540		0.02		540		0.00	1.78	540		0.00		540		0.06	1.16	540			
	600		0.03		600		0.00	1.75	600		0.00		600		0.08	1.12	600			
	720		0.03		720		0.11	1.72	720		0.00		720		0.12	1.1	720			
	840		0.03		840		0.18	1.69	840		0.00		840		0.15	1.09	840			
	960		0.03		960		0.25	1.66	960		0.00		960		0.18	1.05	960			
	1080		0.03		1080		0.32	1.64	1080		0.00		1080		0.22	1.01	1080			
	1200		0.03		1200		0.39	1.62	1200		0.00		1200		0.26	0.97	1200			
	1320		0.03		1320		0.46	1.6	1320		0.00		1320		0.30	0.95	1320			
	1440		0.03		1440		0.53	1.58	1440		0.00		1440		0.37	0.9	1440			
	1560		0.03		1560		0.60	1.55	1560		0.00		1560		0.44	0.86	1560			
	1680		0.03		1680		0.67	1.51	1680		0.00		1680		0.51	0.81	1680			
	1800		0.03		1800		0.74	1.48	1800		0.00		1800		0.58	0.78	1800			
	1920		0.03		1920		0.83	1.45	1920		0.00		1920		0.65	0.71	1920			
	2040		0.03		2040		0.89	1.42	2040		0.00		2040		0.72	0.67	2040			
	2160		0.03		2160		0.95	1.39	2160		0.00		2160		0.79	0.6	2160			
	2280				2280		1.01	1.36	2280		0.00		2280		0.86	0.54	2280			
	2400				2400		1.07	1.33	2400		0.00		2400		0.93	0.48	2400			
	2520				2520		1.13	1.3	2520		0.00		2520		1.01	0.41	2520			
	2640				2640		1.19	1.27	2640		0.00		2640		1.08	0.36	2640			
	2760				2760		1.25	1.24	2760		0.00		2760		1.14	0.29	2760			
	2880				2880		1.3	1.21	2880		0.00		2880		1.24	0.26	2880			
	3000				3000		1.38	1.18	3000		0.00		3000		1.33	0.2	3000			
	3120				3120		1.46	1.16	3120		0.00		3120		1.45	0.17	3120			
	3240				3240		1.54	1.13	3240		0.00		3240		1.49	0.11	3240			
	3360				3360		1.63	1.1	3360		0.00		3360		1.49	0.08	3360			
	3480				3480		1.72	1.06	3480		0.00		3480		1.49	0.04	3480			
	3600				3600		1.81	1.02	3600		0.00		3600		1.49	0.01	3600			
	3720				3720		1.92	0.98	3720		0.00		3720		1.49	0	3720			
	3840				3840		2.01	0.95	3840		0.00		3840		1.49	0	3840			
	3960				3960		2.08	0.92	3960		0.00		3960		1.49		3960			
	4080				4080		2.17	0.89	4080		0.00		4080		1.49		4080			
	4200				4200		2.26	0.85	4200		0.00		4200		1.49		4200			
	4320				4320		2.34	0.8	4320		0.00		4320		1.49		4320			
	5040				5040			0.5	5040				5040				5040			
	5720				5720				5720				5720				5720			
	7200				7200				7200				7200				7200			
	10080				10080				10080				10080				10080			

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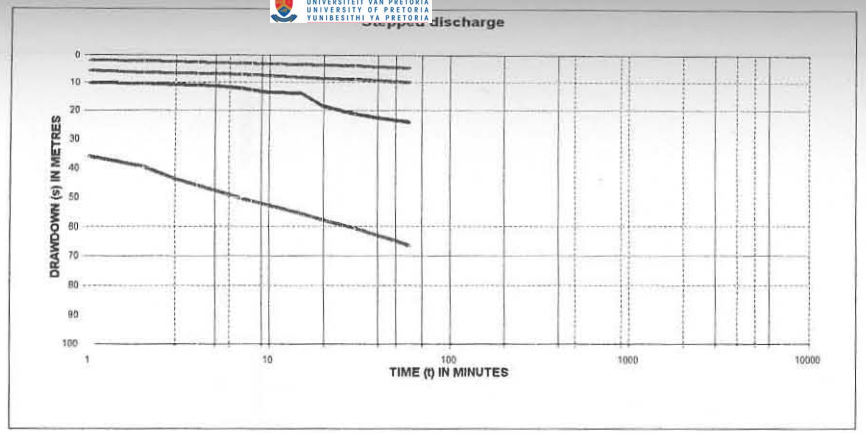

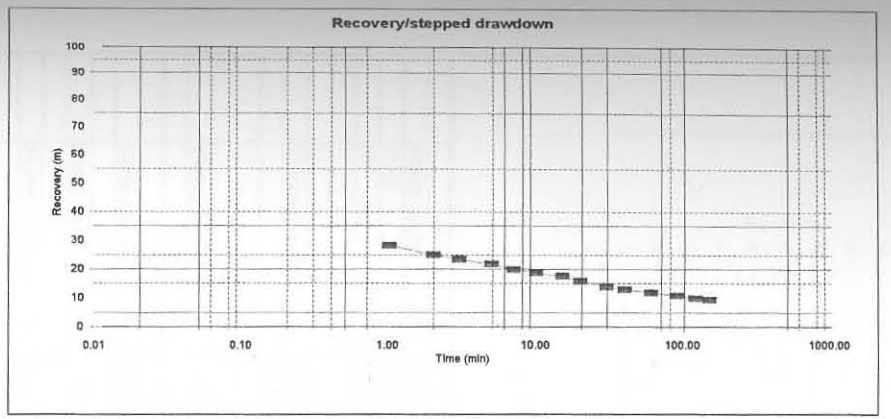

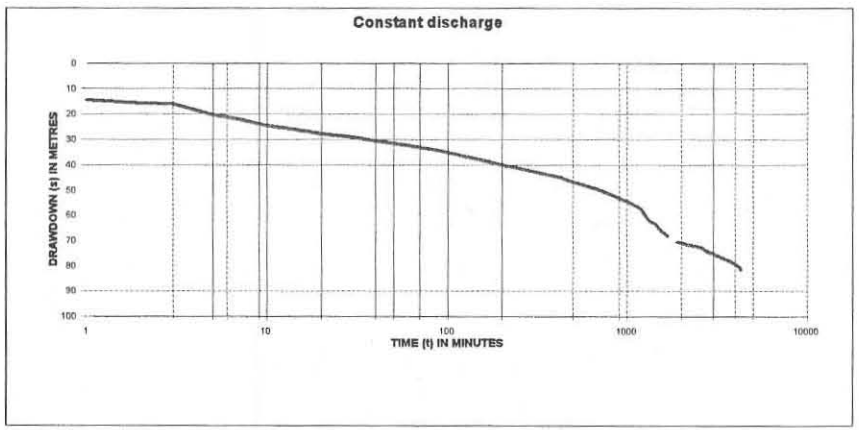

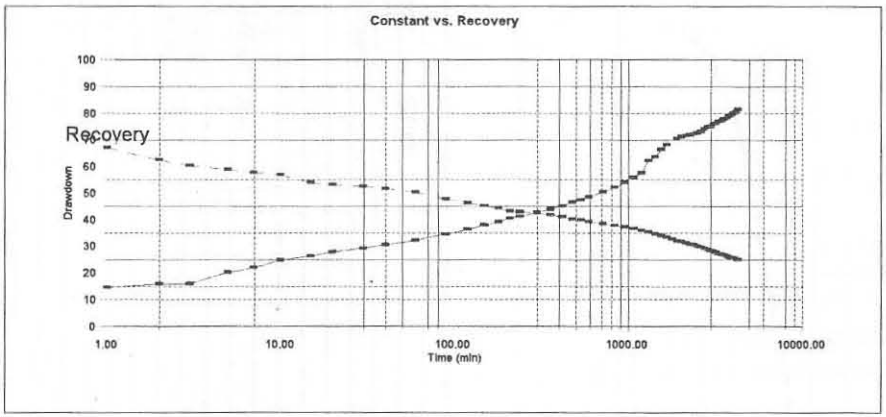

Comments:

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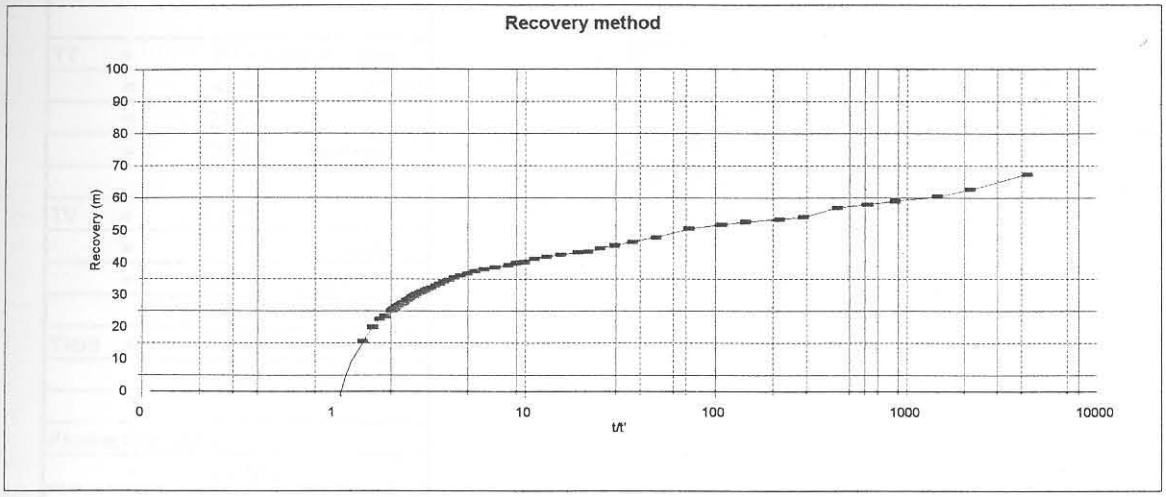
E NUMBER: H06 1038



	Pump cycle =	1440	min	(24hrs)
	Yield =	16.06	l/s	
	t/t" =	1.1	(Graph)	
	Recovery period =	1440 /	t/t"	
		1440 /	1.10	
			1309.09	min
	Pumping period =	1440 -	1309.09	
			130.91	min
	Litres pumped =	1.26E+05	L	
	Pump yield @ 24 hrs	1.46	L/s	
	Factor of safety =	0.75		
	Operating yield =	**1.10**	**L/s for 24 hrs**	

Comments:

Comments:

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Bh no.		H06 1038	
TT	=	PT + recovery time	
	=	4320	17280
	=	21600	
	=	1296000	seconds
TV	=	L/s*TP	
	=	16	4320
	=	4147200	litres
Yield	=	TV/TT	
		3.2	l/s
Production yield			
	=	Yield *FS	
	=	3.2	75%
	=	2.4	l/s @ 24hrs

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FC-METHOD : Estimation of the sustainable yield of a borehole

Borehole:

Extrapolation time in years = (enter)	3	1576800	Extrapol.time in minutes
Effective borehole radius (r_e) = (enter)	3.7 ←	2.5	Estimate of effective r_e
Q (l/s) from pumping test =	16.05	0.13	Estimate of t_c of WBS
s_a (available drawdown), sigma_s = (enter)	68.91	20 ←	Sigma_s from risk analysis
Annual effective recharge (m) =	0.007	55.91	s_available working drawdown(m)
t(end) and s(end) of pumping test =	4320	81.43	End time and drawdown of test
Average maximum derivative = (enter)	72.5 ←	72.5	Estimate of average of max deriv
Average second derivative = (enter)	0.1 ←	0.1	Estimate of average second deriv
Derivative at radial flow period = (enter)	25.9 ←		Read from derivative graph
	T-early[m^2/d] =	9.80	
T and S estimates from derivatives	T-late [m^2/d] =	3.50	T-average = 5.86
(To obtain correct S-value, use program RPTSOLV)	S-late =	4.47E-03	S-estimate could be wrong

BASIC SOLUTION

(Using derivatives + subjective information about boundaries)

(No values of T and S are necessary)

		Maximum influence of boundaries at long time		
	No boundaries	1 no-flow	2 no-flow	Closed no-flow
sWell (Extrapol.time) =	267.52	453.29	639.06	1196.36
Q_sust (l/s) =	3.35	1.98	1.40	0.75
	Best case	→		Worst case

Average Q_sust (l/s) = 1.63

with standard deviation= 1.11

(If no information exists about boundaries skip advanced solution and go to final recommendation)